

**SUPERFUND PRELIMINARY CLOSE-OUT REPORT
LOVE CANAL SITE
NIAGARA COUNTY
NIAGARA FALLS, NEW YORK**

September 1999

Prepared By

**U.S. Environmental Protection Agency, Region II
Eastern New York Remediation Section
Emergency and Remedial Response Division
New York, New York 10007-1866**

282539



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I. INTRODUCTION

This Preliminary Close-Out Report documents that the U.S. Environmental Protection Agency (EPA) has determined that construction activities at the Love Canal site (Site) have been completed in accordance with *Close-out Procedures for National Priorities List Sites* (OSWER Directive 9320.2-09).

The Site has been undergoing remediation for more than 20 years. Given the extent of the contamination, and the fact that the Site was discovered prior to, and was, in fact, a key factor in, the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), numerous Federal, State and local agencies have been involved in the comprehensive cleanup program. Prior to the enactment of CERCLA, initial remedial measures were conducted at the Site by the State of New York, the City of Niagara Falls and the Federal government. Also prior to CERCLA, two Presidential Declarations of Emergency (1978 and 1980) were issued, which provided Federal funding and designated the Federal Emergency Management Agency (FEMA) as the lead Federal agency in the home purchase and residential relocation activities. Subsequent remedial measures were also implemented at the Site in conformance with the following: a July 1982 EPA Region 2 Decision Memorandum; three Records of Decision (RODs), three associated Explanations of Significant Differences (ESDs) and one ROD Amendment; and the Site specific requirements in the Superfund Amendments and Reauthorization Act (SARA) of 1986.

II. SUMMARY OF SITE CONDITIONS

Site Background

The Site is in an urban area in the southeast corner of the City of Niagara Falls, approximately 1/4 mile north of the Niagara River in Niagara County, New York. Approximately 70,000 people live within three miles of the Site. The Site includes the original channel or canal [3,200 feet by 80 feet] built by William T. Love in the late 1800's for a proposed hydroelectric power project which was subsequently abandoned. Between 1942 and 1952, the Hooker Chemicals & Plastics Corporation (now Occidental Chemical Corporation (OCC)) disposed of approximately 22,000 tons of drummed and liquid chemical wastes, including polycyclic aromatic hydrocarbons, halogenated organics, pesticides, chlorobenzenes and dioxin in the abandoned canal, which thereby became the Love Canal Landfill (LCL). In 1953, the LCL was covered with soil and deeded by Hooker Chemicals to the City of Niagara Falls Board of Education.

Subsequently, the surrounding area near the covered LCL was extensively developed with the construction of an elementary school (99th Street School) and numerous homes. Problems with odors and residues in the basements and backyards of the affected properties were first reported

in the 1960's. During the 1970's, unusually high precipitation in the region caused the water table within the LCL to rise, bringing contaminants to the surface which eventually spread laterally into the basements of nearby homes. Various studies, conducted at that time, verified that many toxic chemicals had migrated into the surrounding area directly adjacent to the original disposal site. Dioxin and other contaminants migrated from the LCL to the sanitary and storm sewers which extended outside the LCL boundaries, some with outfalls into nearby creeks, as well as the Niagara River.

In 1978, the New York State Department of Health (NYSDOH) identified more than 80 chemicals in the LCL and adjacent soils. Also in 1978, NYSDOH and the New York State Department of Environmental Conservation (NYSDEC) contacted EPA for technical assistance. Additional sump and air samples found significant chemical contamination in private homes adjacent to the canal. The NYS Commissioner of Health directed local officials to remove all exposed or visible toxic waste and to fence off the LCL.

In July 1978, further sampling prompted the Commissioner of Health to recommend that pregnant women and children under two years of age evacuate the area immediately and that residents close off basements and avoid consuming home-grown produce. An eight-foot-high chain-link fence was installed around LCL, and the two rings of homes adjacent to the east and west sides of the LCL were identified as Ring I and Ring II. In August 1978, President Carter issued the first of two Emergency Declarations at the Site. The first emergency declaration provided federal funding for remedial work to contain the chemical wastes at the Site and for the relocation of Ring I and Ring II residents.

In October 1978, NYSDEC initiated a remedial action; this included the construction of a tile drain system, i.e., a leachate collection system, the installation of a clay cap over the LCL, installation of a fence around the LCL and the construction of an on-site leachate treatment facility. Throughout the Fall of 1979, EPA, NYSDEC and the City of Niagara Falls worked to install a 7,000-foot-long barrier drainage and containment system to prevent outward chemical migration. By December 1979, a temporary clay cap had been constructed, and the leachate collection system and treatment facility was operational.

In May 1980, President Carter issued the second Declaration of Emergency at the Site. This emergency declaration specifically established the Emergency Declaration Area (EDA), surrounding the LCL, and authorized \$20 million of Federal funds for the purchase of homes. FEMA, with the assistance of New York State, evacuated and relocated hundreds of the affected families. As a result, approximately 950 families, of the more than 1,050 families affected, were evacuated from a 10-square-block area surrounding the LCL.

In 1981, EPA proposed the addition of the Site to the National Priorities List (NPL), making it available for funding under the Superfund legislation. The Site was added to the NPL in 1983.

In 1982, the U.S. Department of Health and Human Services and NYSDOH determined that the homes in the EDA outside Ring I and Ring II could be reoccupied. This decision was based on data presented in the May 1982 Environmental Monitoring at Love Canal study, prepared by EPA's Office of Research and Development (ORD). However, because the ORD study was heavily criticized, in 1983, EPA initiated additional study activities to determine the habitability of the EDA. This effort represented the early work of what became known as the Love Canal EDA Habitability Study (LCHS), which is described below.

Site Investigations

In addition to the early studies which lead to the Presidential Declarations of Emergency at Love Canal, there were other field investigations and studies conducted at the Site, including the following:

- ORD - Environmental Monitoring at Love Canal Study [May 1982] (evaluated the nature and extent of contamination throughout the EDA).
- Malcolm Pirnie - Environmental Information Document - Site Investigations and Remedial Action Alternatives - Love Canal [October 1983] (evaluated contamination in creeks and sewers and alternatives for remediation).
- CH2M Hill - Love Canal Sewer and Creek Remedial Alternative Evaluation and Risk Assessment [March 1985] (evaluated risks posed by contamination in creeks and sewers and further evaluated alternatives for remediating the creeks).
- E.C. Jordan - Long-Term Monitoring Program Design for the Love Canal Remedial Project [August 1985] (evaluated contamination in the groundwater and effectiveness of the barrier drain and cap system).
- LCHS [May-July 1988] (evaluated air and soil contamination in the EDA and comparison neighborhoods).
- 93rd St. School Remedial Investigation and Feasibility Study (RI/FS) [March 1988] (evaluated the nature and extent of contamination at the 93rd St. School and alternatives for remediating this contamination).

1986 Superfund Amendments and Reauthorization Act (SARA) Provisions for Love Canal: Habitability Study, Property Acquisition and Maintenance

The 1986 amendments to CERCLA included specific provisions in Section 312, to address the significant program aspects of the Site. These included:

- Completion of a study of the habitability of the EDA, i.e., the LCHS.
- Acquisition of those properties which were not eligible for government acquisition under the FEMA acquisition program.
- Maintenance of property acquired under the FEMA and SARA acquisition programs.

- Provision of technical assistance to the Love Canal Area Revitalization Agency¹ (LCARA) to facilitate their efforts to revitalize the EDA.

The five-volume LCHS was completed during May-July 1998. In September 1988, using the results of the LCHS, the NYSDOH Commissioner of Health issued a Decision on Habitability, which identified appropriate land uses for the seven areas of the EDA. Areas 1-3 were declared not suitable for residential use, i.e., nonhabitable, but were suitable for commercial/industrial use. Areas 4-7 were deemed habitable, i.e., suitable for residential use.

Consistent with the habitability criteria and the Commissioner's determination, a "hot spot" of contamination was removed from two lots in EDA Area 4; this soil removal is documented in EPA's September 1993 Remedial Action Report for the Site.

In 1987, EPA entered into the first of two cooperative agreements with LCARA to implement the mandates of Section 312 of CERCLA. This first agreement dealt with EDA property acquisition. EPA's September 30, 1996 Remedial Action Report for the Site under the LCARA Property Acquisition Cooperative Agreement documents the EPA property acquisition program; LCARA purchased approximately 100 properties under this program. Overall, LCARA purchased over 600 properties in the EDA under the EPA and other acquisition programs.

In 1989, EPA entered into a second cooperative Agreement with LCARA to implement the maintenance and technical assistance (MATA) mandates of Section 312 of CERCLA. Under this MATA agreement, EPA provided LCARA with funding to maintain improved and unimproved properties in the EDA. EPA's funding for this program will terminate in May 2000. While the majority of these funds were used to maintain those EDA homes slated for rehabilitation, a portion of the funds were also used to demolish EDA homes that had deteriorated to the extent that they presented safety concerns or a net loss to the overall value of the property. Over 250 homes were demolished under the MATA program.

EPA's technical assistance has supported LCARA's efforts to revitalize the EDA. LCARA has sold 239 homes in the areas slated for residential use and has established a master plan for the areas slated for commercial/industrial use.

Record of Decision Findings

In July 1982, the EPA Region 2 Administrator issued a Decision Memorandum: Cooperative Agreement with the State of New York for Love Canal; this document was a precursor to the

¹ The Love Canal Area Revitalization Agency is a New York State Agency which was designated as the lead agency in the rehabilitation effort of the Love Canal EDA.

Superfund ROD. This memorandum approved Federal funding for various remedial measures, including:

- construction of an extension to and improvement of the existing barrier drain/leachate collection system;
- construction of a new leachate treatment facility;
- covering the temporary clay cap with a synthetic material to prevent rain from coming into contact with the buried wastes;
- demolition of houses directly adjacent to the landfill and the nearby school;
- demolition of the 99th Street School;
- plugging and abandonment of existing on-site water, gas and storm sewer facilities;
- conducting studies to determine the best way to proceed with cleanup of the EDA creeks and sewers; and,
- monitoring to ensure that the effectiveness of the cleanup activities.

In May 1985, EPA issued a ROD with a selected remedy to remediate the sewers and the creeks in the EDA. This ROD called for:

- hydraulically cleaning the sewers;
- dredging and hydraulically cleaning the Black Creek culverts;
- removing Black and Bergholtz creek sediments with dioxin concentrations exceeding one part per billion (ppb);
- construction of an on-site interim storage facility for the creek and sewer sediments; and,
- remediation of the 102nd Street outfall area (which was subsequently addressed under the remedial action for the 102nd Street Landfill Superfund site).

In October 1987, EPA issued a second ROD and selected a remedy to address the destruction and disposal of the dioxin-contaminated sediments from the sewers and creeks. The ROD called for:

- construction of an on-site facility to dewater the sewer and creek sediments and to contain the dewatered sediments;
- construction of a separate on-site facility to treat the dewatered sediments through high temperature thermal destruction;
- on-site thermal treatment of the residuals stored at the Site from the leachate treatment facility and other associated Love Canal waste materials; and,
- on-site disposal of any nonhazardous residuals from the thermal treatment or incineration process.

In 1989, EPA published an ESD to the 1985 and 1987 RODs, which specified that creek sediments were to be dewatered at creek side, placed in polyethylene bags and then transported and stored at OCC's RCRA-permitted storage buildings at its Niagara Falls Main Plant, pending

high temperature thermal destruction at OCC's Niagara Falls Main Plant. In addition, other Love Canal wastes, including the sewer sediments and other remedial wastes originally targeted for thermal treatment at the Site, were also to be thermally treated at OCC's Niagara Falls Main Plant rather than at the Site. OCC, the United States and the State of New York entered into an agreement, i.e., a partial consent decree (PCD), filed in U.S. District Court, to implement this modification to the 1987 ROD.

In November 1996, EPA issued a second ESD for the 1987 ROD. This ESD authorized thermal treatment and/or land disposal of the stored Love Canal waste materials at an off-site commercial incinerator and landfill rather than at OCC's Niagara Falls Main Plant. In December 1998, EPA issued a third ESD which provided notice that EPA was granting a treatability variance to OCC to eliminate the requirement that the stored Love Canal waste materials containing dioxin at concentrations between 1 and 10 ppb be incinerated. As a result of this variance, these materials could be disposed at a commercial hazardous waste landfill without treatment.

In September 1988, EPA issued a third ROD which selected a remedy for contaminated soils at the 93rd Street School. The selected remedy included the following actions:

- excavation of approximately 7500 cubic yards of contaminated soil adjacent to the school;
- on-site solidification and stabilization of the contaminated soils; and,
- return of the stabilized soils to the excavated area.

After the issuance of the 1988 ROD, the Niagara Falls Board of Education raised concerns that leaving the treated soils on-site would limit its options for reuse of the property. In May 1991, EPA issued an amendment to the 1988 ROD, which modified the remedy and called for excavation and off-site disposal of the contaminated soils.

Remedial Actions

All remedial activities which were conducted at the Site between 1978 and 1982 are documented in EPA's 1982 Decision Memorandum.

Improvements to the Containment System

The remedial actions specified in the July 1982 Decision Memorandum were all completed by 1985. By June 1983, the Ring I and Ring II homes adjacent to the LCL had been demolished, as well as the 99th Street School. In 1985, NYSDEC installed the 40-acre cap consisting of high-density polyethylene liner which was then covered by 18 inches of clean soil and seeded for grass. In addition, the leachate collection system was improved, and a new leachate treatment facility was constructed. These actions are documented in the Final Report Love Canal Remedial Action Project - Northern and Central Sectors, November 1985.

Removal of Contaminated Creek and Sewer Sediments

The remediation of the contaminated sewers was performed during 1986 and 1987. A total of 68,000 linear feet of storm and sanitary sewers were cleaned. An on-site facility was constructed to dewater sewer contaminants. From 1987 until 1989, Black and Bergholtz creeks were dredged of approximately 14,000 cubic yards of sediments. Clean riprap was placed in the creek beds, and the banks were replanted with grass. These two remedial actions conformed with the portions of the 1985 ROD, requiring the removal of dioxin-contaminated sediments from the creeks and sewers. The majority of sewer remediation work is documented in the 1987 ROD, with some additional sewer cleanup in 1987. The creek work is documented in the Final Engineering Report - Love Canal Black and Bergholtz Creeks Remediation, October 1990.

In addition, a small section of the Frontier Avenue sewer which ran along the outskirts of the containment system was rerouted in 1992. This action was documented in the September 1993 Remedial Action Report for the Love Canal Site: EDA 4, Frontier Avenue/100th Street and the Love Canal Cap Repair.

Interim Storage and Treatment/Disposal of Creek and Sewer Sediments and Other Love Canal Waste Materials

The treatment and disposal of the sewer and creek sediments represents the last remedial action to be completed for the Site. In 1988, concurrent with the excavation of the creek sediments by Severson Environmental, Inc., contractor to NYSDEC, OCC's contractor, Conestoga-Rovers & Associates Limited, received the sediments at a staging area near the 93rd St. School. At this staging area, the creek sediments were dewatered, stabilized, bagged and transported to OCC's Niagara Falls Main Plant for temporary storage in its RCRA-permitted storage buildings, awaiting thermal treatment and/or land disposal at facilities outside of New York State. The sewer sediments and other Love Canal wastes targeted for treatment under the 1987 ROD were also bagged and transported for storage to OCC's Niagara Falls Main Plant. A total of 15,496 bags, representing approximately 39,000 cubic yards of Love Canal waste materials, were stored at OCC's Niagara Falls Main Plant. In February 1998, OCC began shipping the bagged Love Canal wastes for disposal from its storage facilities. In August 1999, the last remaining bags of wastes were shipped for ultimate disposal, either for thermal destruction or for landfilling. Of these, 10,262 bags were directly land disposed in a Subtitle C facility at the Grassy Mountain Landfill, Utah. The remaining 5,234 bags were incinerated at Deer Park, Texas and Araganite, Utah, prior to land disposal of the ash residue in Subtitle C facilities at Deer Park, Texas and Grassy Mountain, Utah, respectively.

Excavation and Off-site Disposal of Contaminated Soils at the 93rd Street School

In 1992, the contaminated soils at the 93rd Street School were excavated; these materials were used for alternate grading material for the 102nd Street Landfill Superfund site Remedial Action.

This Remedial Action was completed in September 1992 and is documented in the September 1992 Final Report for the Remediation of the 93rd Street School Site.

III. DEMONSTRATION OF QUALITY ASSURANCE/QUALITY CONTROL

The Quality Assurance/Quality Control program used throughout the performance of the various Remedial Actions was rigorous and in conformance with EPA and State standards; therefore, EPA and New York State determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the Remedial Actions, consistent with the 1982 Decision Memorandum, the 1986 SARA Amendments, the 1985, 1987 and 1998 RODs, the 1991 ROD Amendment and the Remedial Design plans and specifications.

IV. MONITORING RESULTS

The effectiveness of the containment system at Love Canal has been monitored for more than fourteen years. An extensive array of nearly 200 monitoring wells currently exists around the containment area. The monitoring data have undergone significant scrutiny in the past, especially during the LCHS. Effective containment of the disposal area was a requirement for residential use of any part of the EDA. In June 1987, the final report from first year's monitoring data showed that concentrations of various contaminants in groundwater and surface water outside of the perimeter of the containment system were at low levels or below detection. In 1988, the Commissioner of Health's Habitability Decision acknowledged that the system was working effectively. Currently, the leachate collected in the barrier drainage system is treated in an on-site activated carbon leachate treatment facility. Treated wastewater is discharged to the City of Niagara Falls Wastewater Facilities. Dense nonaqueous phase liquids are stored on-site with eventual incineration at OCC's liquid incinerator at OCC's Niagara Falls Main Plant. Spent carbon is shipped off-site for disposal on a regular basis. Extensive monitoring data from the various perimeter monitoring wells, which ring the capped LCL, indicate that the containment system is working effectively.

OCC has taken over the day-to-day Operation and Maintenance (O&M) activities at the Site. NYSDEC oversees OCC's O&M activities and provides direction to OCC on the scope and extent of the annual monitoring tasks. Included in the O&M is the requirement for annual monitoring and reporting. The O&M activities, performed on an annual basis, include groundwater monitoring at various wells on or around the Site; groundwater elevations at piezometers located around the Site; and, a performance assessment of the Love Canal leachate treatment facility and the barrier drain system. The 1998 data results show that there has been no significant change in chemical conditions and that the barrier drain is successfully capturing leachate from the Site and preventing off-site migration of chemicals. Hence, monitoring results continue to confirm that the remediation and containment system, i.e., the leachate collection and treatment system, is functioning properly.

V. ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

The activities that remain to be completed at the Site include preparing a Remedial Action Report for the treatment/disposal of the creek and sewer sediments, performing O&M and monitoring activities, preparing a Close-Out Report and deleting the Site from the NPL. These activities will be completed in accordance to the following schedule:

Activity	Responsibility	Date
Final RA Report for Thermal Destruction of Creek and Sewer Sediments and other Love Canal Materials	PRP	12/99
Operation, Maintenance and Monitoring	PRP	Ongoing
Approve Close-Out Report	EPA	4/00
Five-Year Review	EPA	9/04

VI. FIVE-YEAR REVIEW

SARA added Section 121(c) to CERCLA requiring five-year reviews of remedial actions. None of the post-SARA remedial decisions that were implemented at the Site resulted in hazardous substances remaining on-site. It is the policy of EPA to conduct five-year reviews of pre-SARA remedies which result in hazardous substances remaining on-site. The containment of the LCL was a pre-SARA decision. Consequently, EPA will conduct a five-year review of the Site before September 2004.

Approved by: _____



Richard L. Caspe, P.E., Director
Emergency and Remedial Response Division

Date: _____

9/29/99

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